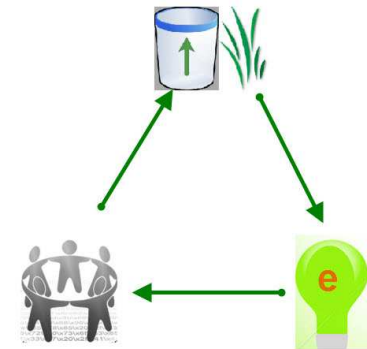




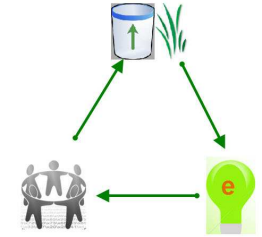
# COMBINE

COMmunity  
Biomass for  
INtegrated  
Eenergy production





## Status-quo



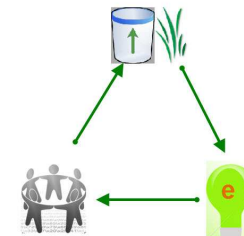
Biomass from grasslands is currently not used

Cutting of grasslands in order to conserve biodiversity has to be subsidized

Local and diversified action is needed to transform the current energy system and mitigate climate change

 **COMBINE!**

# What do get for your money ?



a broad **potential analysis** and feasibility study for bioenergy generation in the region



the **planning, designing and installation** of a bioenergy plant specifically developed for waste biomass, training, continuous advising and technical **service**

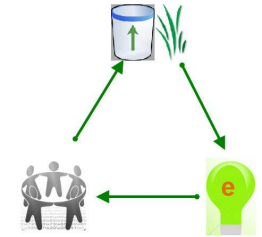


1,380 MWh



14,520 MWh

# Value Offering



## ***The **values** our service creates:***

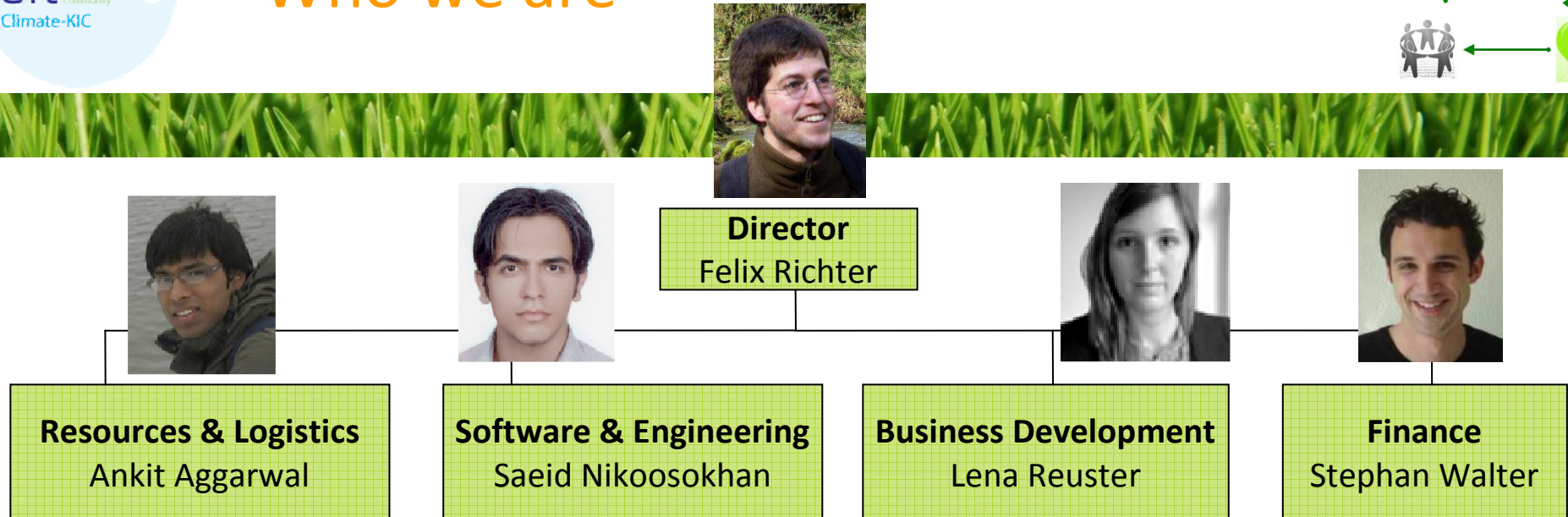
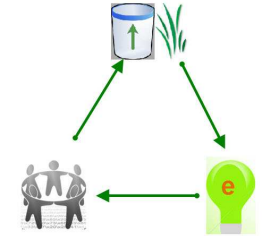
- renewable energy and thus mitigate climate change
- recycle regional waste biomass
- energy autonomy
- make conservation of species-rich grassland economically feasible
- local value and eco-innovative community
- additional values (organic fertilizer, clean heating for public buildings)

## ***The **benefits** of the **new technology** are:***

- to overcome the limits of conventional bioenergy systems
- to use new unexploited sources of community waste biomass (grasslands, landscape management areas, roadside cuttings, etc.)
- to produce electricity and solid fuel (pellets) locally
- to avoid competition with food production for limited land



## Who we are



**Felix:** Biomass potential analysis, project management

**Lena:** Public policy, market research

**Stephan:** Financial management, market research

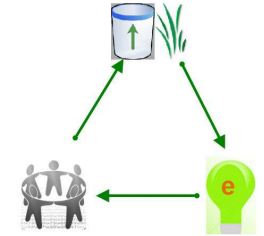
**Ankit:** Stakeholder analysis, resource management

**Saeid:** Software development, service

**Requirement:** Mechanical engineer (planning, designing, installation of the plant)



# Market potential and target customer



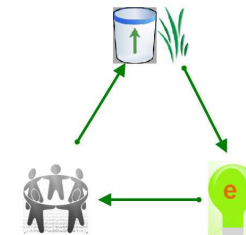
## Target customers

- Administrativ districts (Landkreise) covering several municipalities
- Single municipalities with large waste biomass sources
- The target customer may vary with the national markets explored due to different national administrativ structures (public or private local utility company)

## Market potential

- In a first step, target Germany as the primary market
- Supply potential assumed to be limited to three projects per year
- 1,180,000 ha of semi-natural grassland in Germany and hence an average of 3,920 ha/district (variance, though)
- There are 301 districts in Germany, approximately 30% of these districts can offer an adequate amount of waste biomass
  - ➡ **ca. 100 potential customers in Germany**
- Future markets: other European countries with regulations for the conservation of semi-natural grasslands and no utilisation for the biomass (large potentials in UK, Eastern Europe)
  - ➡ **the market has considerable growth potential**

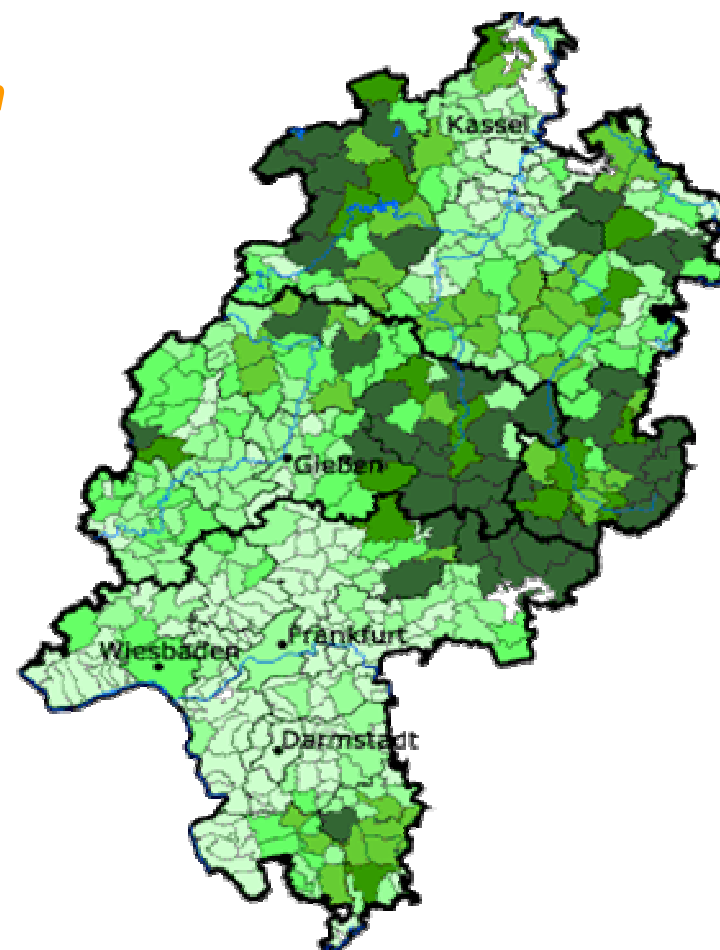
# Market potential and target customer



## Example for grassland in the State of Hessen

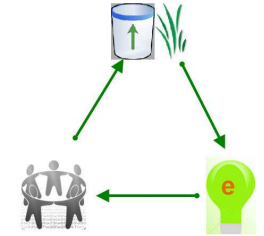
### Grünlandfläche in ha

unter 300	
300 bis unter 600	
600 bis unter 900	
900 bis unter 1200	
1200 bis unter 1500	
1500 und mehr	





# Competitive environment & USP



## *Competitive Environment*

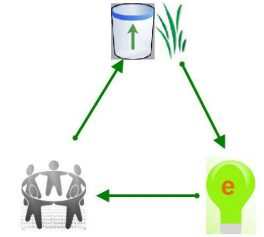
- Competition with alternative sources of bio-energy production (biochar)
- Energy efficiency (performance) in contrast to other renewable energy sources like wind and solar
- Performance compared to existing fossil fuel based energy systems

## *USP*

- New technology, which is able to utilise unexploited biomass
- Combining nature conservation with economic benefits (energy production)

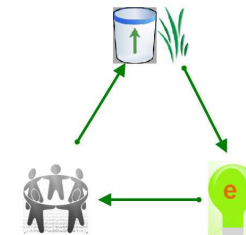


# Critical Success Factors



- Overcome possible technical challenges concerning the up-scaling of the plant:  
→ e.g. mechanical pre-treatment
- Contract an external manufacturer for our new technology (or: partner with existing patent-holder)
- National approval / certification for the plant (e.g. TÜV)
- A reasonable purchase price of technology
- Enough municipalities participating in the build-up of a model plant
- Prove of economic viability of the model plant & service concept
- **Keep an eye out for a possible GORILLA**

# Financing

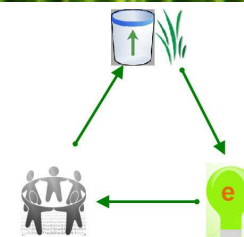


Biogas Conversion Plant	€	Comments
Sale of Pellets (3,630 t/a )	726,000	3,630 t/a
Sale of Electricity (1,380 MWh/a)	241,500	1,380 MWh/a (CHP: 200 kW)
<b>Total Revenue</b>	<b>967,500</b>	
Fix Costs	382,500	Investment: 2.25 Mio. € (Life Span: 10 Years)
Variable costs (energy Input)	234,000	825 MWh Diesel, 1,350 MWh Electricity
Variable costs (material, etc.)	49,000	
Variable costs (biomass)	90,000	3,000 t grassland biomass, 2,500 t waste biomass
Variable costs (labour)	60,000	1.5 full-time labour
<b>Total Costs</b>	<b>766,500</b>	
<b>Annual Profit</b>	<b>152,000</b>	

- Salaries and material costs are yet to be considered
- Funding for start-ups can contribute to these costs (e.g. EXIST Seed)



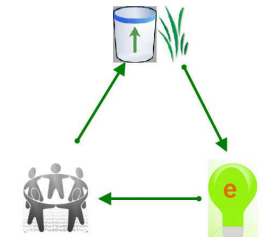
And now ...



?



# SWOT



## STRENGTHS

- ✓ Creating value out of a resource that is not being used yet
- ✓ New technology
- ✓ Team (divers, expertise, international)
- ✓ Tackling several problems (biodiversity conservation, waste recycling and energy generation)
- ✓ allround service
- ✓ existing network in Hessen (D), Estonia and Wales

## WEAKNESSES

- ✓ New technology
- ✓ Costs (requires large investment)
- ✓ No experience in entrepreneurship within the team)
- ✓ large number of stakeholders involved --> coordination can be costly (in terms of time, administration,...)

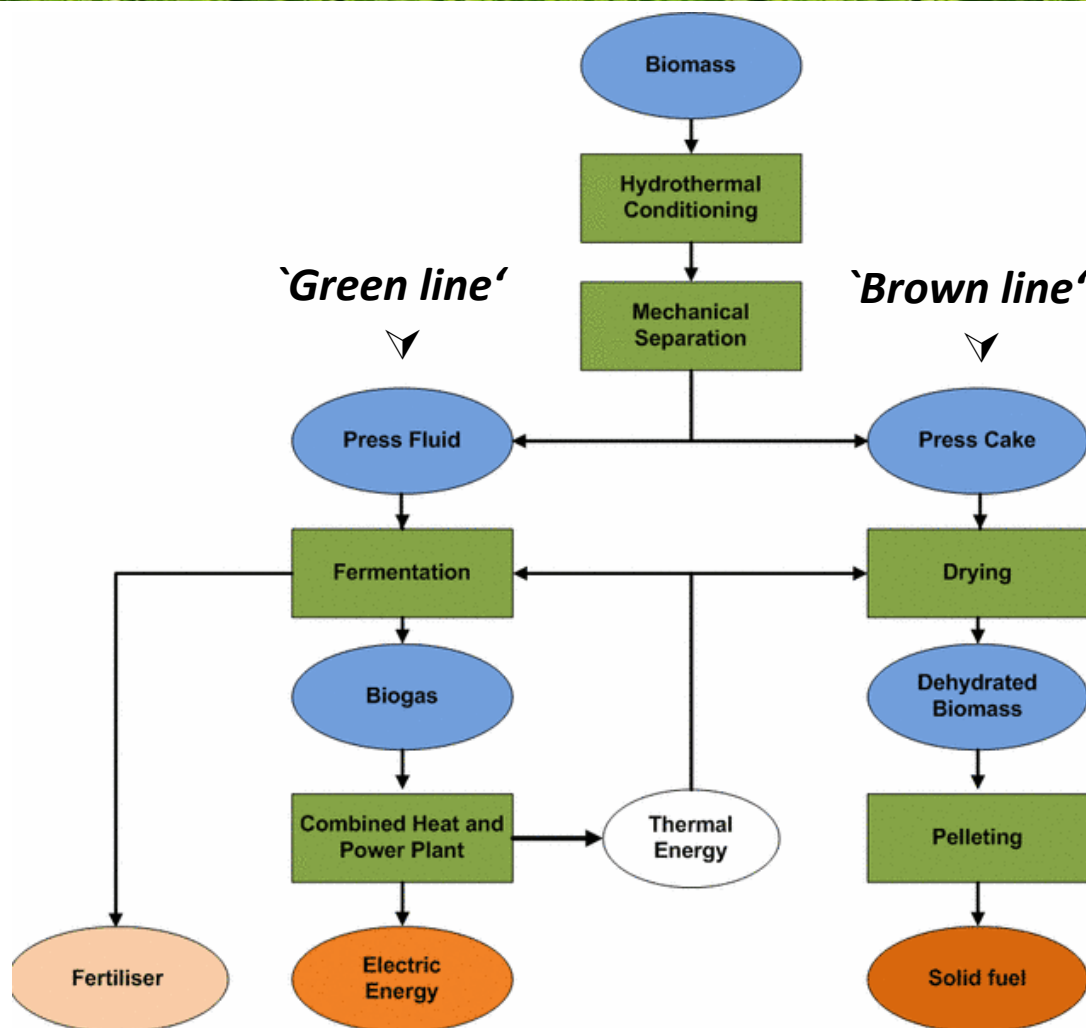
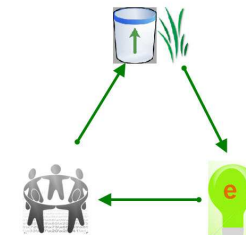
## OPPORTUNITIES

- ✓ first customer already existing
- ✓ subsidies for bioenergy (in D and other EU countries)
- ✓ regulations regarding bioenergy/ renewable energy and nature conservation
- ✓ increasing (fossil) fuel price
- ✓ wood pellets have limited growth potential --> offering substitute
- ✓ creating incentives for farmers to participate --> value creation (monetary and intrinsic)

## THREATS

- ✓ Dependence on existing infrastructure of each district (customer)
- ✓ alternative bioenergy systems/ technologies, for instance Biochar
- ✓ future regulation and subsidies

# The technology



*Conserved as silage*

**'Green line':**  
*Readily digestible compounds  
(proteins, sugars) & minerals*

**'Brown line':**  
*Ligno-cellulose*

**End Products ➤ Market**